Utilization of the Spidron System for Generating Force Absorbing Structures

Hughes, Steve

This project's purpose is to investigate the usage of the spidron system for automotive crush zones and force absorption applications. The engineering goal of this project is to utilize the spidron theory to create a system for generating structures that in which all aspects of an impact are controlled predominantly via structural design, primarily density. The functionality of the system is intended as a single use force absorber for <3500 N impacts. If mirrored spidron nests are impacted with even pressure and the same amount of force Spidron design n6b(p) will absorb the most amount of impact force since n8b(p) and n12b(p) are both too dense, as a result of their increased density due to a greater number of spidron arms present in their design (more mass in the same amount of space) air chambers where also divided into much smaller regions contributing to the results. The data obtained through experimentation satisfied the research hypothesis as spidron nest n6b absorbed the most amount of force as it had the best balance between "too dense" and "not dense enough", the engineering goal was satisfied through the design theory and the physical objects constructed for testing, as they make use of mirrored spidron tessellations. The largest error in the project testing was in the relative size between the n6b spidrons and the n8b and n12b spidron, which was an unavoidable error on the printing service's end, in the end it did not affect results though, because the spidron that performed the best was very clear and defined. This project has a clear and purposeful application to the automotive industry, particularly safety in the industry and automotive impact zones.

Awards Won: